DEPARTMENT OF THE NAVY
OFFICE OF NAVAL RESEARCH
875 NORTH RANDOLPH STREET
SUITE 1425
ARLINGTON, VA 22203-1995

IN REPLY REFER TO:

5720
Ser BD042/048
ONR FOIA 16-051
April 7, 2016

Dr. Dorion Liston
13036 Pine Street
Boulder Creek, CA 95006

Dear Dr. Liston:

This is the final response to your Freedom of Information Act (FOIA) request received by the Office of Naval Research (ONR) on March 29, 2016 and given the number 16-051 in our system. You requested a copy of the "approved" version of the seven-page whitepaper proposal funded for FY16, beginning with a title page and ending with a reference list. You indicated that the title of the paper was "Assessment of Brain Health with COBRA Oculometric Technologies." For your reference, I have attached a copy of your request.

We have located a seven-page statement of work that appears to match the description of the records you have requested. Please note that the ONR FY16 Whitepaper is a revised statement of work intended to modify the work done in FY16. However, this modified statement of work was not accepted nor approved by ONR. Parts of the white paper you requested were redacted under 5 U.S.C. § 552 (b)(4), better known as Exemption 4 of the FOIA. We consider individual component prices and the names of key personnel to be confidential commercial information exempt from disclosure under Exemption 4. Since you agreed to accept clearly releasable information, we do not consider this to be a denial, or partial denial, of your request.

We classify you as a "commercial" requester. As such, we may charge you for all search, review, and duplication costs. Accordingly, you are responsible for $44.00 in costs for one (1) hour of professional search and review time. Since the responsive records are already in an electronic format, there is no charge for duplication. Please forward a check or a money order for $44.00 within 30 days from the date of this letter payable to the Treasury of the United States. You should mail your check to:

Office of Naval Research
Code BD042, Room 620
One Liberty Center
875 North Randolph Street
Arlington VA 22203-1995

To ensure that your account is credited, you must reference ONR FOIA request 16-051 on your check or money order and attach it to a copy of this letter. If we do not receive your payment within 30 days, ONR may institute a collection action under Federal debt collection

statutes. These statutes provide for recovery of interest and administrative costs and penalty charges for handling a delinquent debt owed to the government

If you have questions about this letter, please feel free to contact Ms. April Harrid at (703) 696-4309 or ONRFOIA@navy.mil. Please reference ONR FOIA 16-051 when communicating with us about this case.

Sincerely,

Ed Orlowsky
Director
Management Services Division, BD042

Attachments:
As stated

RECORD OF FREEDOM OF INFORMATION (FOI) PROCESSING COST

Please read instructions on back before completing form.

REPORT CONTROL SYMBOL
DD-DA&M(A)1365

1. REQUEST NUMBER	2. TYPE OF REQUEST (X one)		3. DATE COMPLETED (YYYYMMDD)	4. ACTION OFFICE
16-051	X a. INITIAL	b. APPEAL	20160406	Office of Naval Research

5. CLERICAL HOURS (E-9/GS-8 and below)	FEE CODE	(1) TOTAL HOURS	(2) HOURLY RATE		(3) COST
a. SEARCH	1			=	0.00
b. REVIEW/EXCISING	2		X $20.00		0.00
c. OTHER ADMINISTRATIVE COSTS	3				0.00

6. PROFESSIONAL HOURS (O-1 - O-6/GS-9-GS-15)/CONTRACTOR	FEE CODE	(1) TOTAL HOURS	(2) HOURLY RATE		(3) COST
a. SEARCH	1	0.50			22.00
b. REVIEW/EXCISING	2	0.50	X $44.00	=	22.00
c. OTHER/COORDINATION/DENIAL	3				0.00

7. EXECUTIVE HOURS (O-7 - ES 1 and above)	FEE CODE	(1) TOTAL HOURS	(2) HOURLY RATE		(3) COST
a. SEARCH	1				0.00
b. REVIEW/EXCISING	2		X $75.00	=	0.00
c. OTHER/COORDINATION/DENIAL	3				0.00

8. COMPUTER SEARCH	FEE CODE	(1) TOTAL TIME	(2) RATE		(3) COST
a. MACHINE TIME (Not PC, desktop, laptop)	4				0.00
b. PROGRAMMER/OPERATOR TIME (Human)			X	=	
(1) Clerical Hours	1		$20.00/hr		0.00
(2) Professional Hours	1		$44.00/hr		0.00

9. OFFICE MACHINE COPY REPRODUCTION	FEE CODE	(1) NUMBER	(2) RATE		(3) COST
a. PAGES REPRODUCED FOR FILE COPY	3		.15		0.00
b. PAGES RELEASED	5		X .15	=	0.00

10. PRE-PRINTED PUBLICATIONS	FEE CODE	(1) TOTAL PAGES	(2) RATE		(3) COST
a. PAGES PRINTED	5		X .02	=	0.00

11. COMPUTER PRODUCT OUTPUT/ACTUAL COST CHARGES	FEE CODE	(1) NUMBER	(2) ACTUAL COST		(3) COST
a. TAPE/DISC/CD	6				0.00
b. PAPER PRINTOUT	3		X	=	0.00

12. OTHER ADMINISTRATIVE FEES	FEE CODE	(1) NUMBER	(2) ACTUAL COST		(3) COST
a. ALL POSTAGE/ADMINISTRATIVE (See instructions)	3		X	=	0.00

13. AUDIOVISUAL MATERIALS	FEE CODE	(1) NUMBER	(2) ACTUAL COST		(3) COST
a. MATERIALS REPRODUCED	4		X	=	0.00

14. SPECIAL SERVICES	FEE CODE	(1) NUMBER	(2) ACTUAL COST		(3) COST
a. ALL SPECIAL SERVICES (See instructions)	6		X	=	0.00

15. MICROFICHE REPRODUCED	5		X .25	=	0.00

FEE CODES

1 Chargeable to "commercial" requesters. Chargeable to "other" requesters after deducting 2 hours.
2 Chargeable to "commercial" requesters only.
3 Not chargeable to any fee category.
4 Chargeable to "commercial". Chargeable to "other" after deduction of the equivalent of 2 hours. (Example: deduct $88.00 professional rate.)
5 Chargeable to all fee categories after deduction of 100 pages (DOES NOT include "commercial").
6 Chargeable to all fee categories. No deductions.

16. FOR FOI OFFICE USE ONLY			
a. TOTAL COLLECTABLE FEES			
b. TOTAL PROCESSING FEES			$44.00
c. TOTAL CHARGED			$44.00
d. FEES WAIVED/REDUCED (X one)	Yes		No
e. FEES NOT APPLICABLE (X one)	Yes		No

See Chapter 6, Fee Schedule, DoD 5400.7-R, to determine appropriate assessment of fees.

DD FORM 2086, JAN 2003   PREVIOUS EDITION IS OBSOLETE.   Adobe Professional 7.0

INSTRUCTIONS FOR COMPLETING DD FORM 2086

This form is used to record costs associated with the processing of a Freedom of Information request.

1. REQUEST NUMBER - First two digits will express Calendar Year followed by dash (-) and Component's request number, i.e., 03-001.

2. TYPE OF REQUEST - Mark the appropriate block to indicate initial request or appeal of a denial.

3. DATE COMPLETED - Enter year, month and day, i.e., 20031001.

4. ACTION OFFICE - Enter the office processing this request.

5. CLERICAL HOURS - For each applicable activity category, enter time expended to the nearest 15 minutes in the total hours column. The activity categories are:

Search - Time spent in locating from the files the requested information.

Review/Excising - Time spent in reviewing the document content and determining if the entire document must retain its classification or segments could be excised thereby permitting the remainder of the document to be declassified. In reviews for other than classification, FOI exemptions 2 through 9 should be considered.

Other Administrative - Time spent in activity other than above, such as hand carrying documents to other locations, restoring files, etc.

- Multiply the time in the total hours column of each category by the hourly rate and enter the cost figures for each category.

6. PROFESSIONAL HOURS - For each applicable activity category, enter time expended to the nearest 15 minutes in the total hours column. The activity categories are:

Search/Review/Excising/Other - See explanation above.

- Multiply the time in the total hours column of each category by the hourly rate and enter the cost figures for each category.

7. EXECUTIVE HOURS - For each applicable activity category, enter the time expended to the nearest 15 minutes in the total hours column. The activity categories are:

Search/Review/Excising/Other - See explanation above.

- Multiply the time in the total hours column of each category by the hourly rate and enter the cost figures for each category.

8. COMPUTER SEARCH - When the amount of government-owned (not leased) computer processing machine time required to complete a search is known, and accurate cost information for operation is available, enter the time used and the rate. Then, calculate the total cost which is fully chargeable to the requester.

- Programmer and operator costs are calculated using the same method as in Items 5 and 6. This cost is also fully chargeable to requesters as computer search time.

9. OFFICE COPY REPRODUCTION - Enter the number of pages reproduced and/or released.

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- Multiply the total number of pages by the rate per page and enter cost figures.

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- Multiply by the actual cost per tape or printout and enter cost figures.

12. OTHER ADMINISTRATIVE FEES - Covers postage (when known), correspondence preparation, other non-billable charges not covered under Items 5 - 7, etc.

13. AUDIOVISUAL MATERIALS - Duplication cost is the actual cost of reproducing the material, including the wages of the person doing the work.

14. SPECIAL SERVICES - Covers items outside of the FOIA such as authenticating records at $5.20 per seal, overnight mail at cost, and other services for which the requester agrees to reimburse the agency.

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Total Collectable Fees - Add the blocks in the cost column and enter total in the total collectable fees block. Apply the appropriate waiver for the category of requester prior to inserting the final figure. Further discussion of chargeable fees is contained in Chapter VI of DoD Regulation 5400.7-R.

Total Processing Fees - Add all blocks in the cost column and enter total in the total processing fees block. The total processing fees in most cases will exceed the total collectable fees.

Total Charged - Enter the total amount that the requester was charged, taking into account the fee waiver threshold and fee waiver policy.

Fees Waived/Reduced - Indicate if the cost of processing the request was waived or reduced by placing an "X" in the "Yes" block or the "No" block.

Fees Not Applicable - Indicate if the cost of processing the request was not applicable by placing an "X" in the "Yes" block or the "No" block.

- The clock has been started.
- The request changes have been successfully saved.

Request Details

Status : *Initial Evaluation*   **Due Date :** *04/26/2016*

0

Submitted	Evaluation	Assignment
		Processing

Tracking Number : DON-
NAVY~~Closed~~ 03/28/2016

2016-004899

Liston

Requester : Dr.
Dorion 03/29/2016

03/28/2016

Organization : N/A

Requester Has Account : No

Email Address :
dorion.liston@gmail.com
04/26/2016

Phone Number : 415-
992-

1745

Fax Number : N/A

Address : 13036
Pine

Street

City : Boulder
Creek

State/Province : CA

Zip Code/Postal Code : 95006

Submitted Date :

Perfected Date :

Last Assigned Date :

Fee Limit : $50.00

Request Track : Simple

Due Date :

Assigned To : Office
of Naval
Research

Last Assigned By : N/A

Submission Details   Case File   Admin Cost   Assigned Tasks
Comments (0)   Review

Request Handling

Requester Info Available to the Public : No ⌄

Request Track :

Simple ⌄

Fee Category :

Commercial ⌄

Fee Waiver Requested: No

Fee Waiver Status: N/A

Expedited Processing Requested : No

Expedited Processing Status : N/A

Request Perfected : Yes

Perfected Date :

03/29/2016

Appellate Authority :

OGC ⌄

Acknowledgement Sent Date:

Unusual Circumstances ? : No

5 Day Notifications: No

Litigation : No ⌄

Request Description

Short Description :

This FOIA request concerns a "whitepaper" proposal for a research project funded by Code 34 in Dr. Tim Bentley's BLAST program, entitled "Assessment of Brain Health with COBRA Oculometric Technologies" (or similar) with subtitle "characterization of neurological signs of TBI, fatigue, and PTSD using a NASA-developed oculomotor test battery" (or similar) funded by the Office of Naval Research. I am seeking the APPROVED version of the proposal FUNDED for FY16, and will be approximately seven pages long, beginning with a title page and ending with a reference list.

Description Available to the Public : No ⌄

Has Description Been Modified? ☐

Additional Information

Case # :

Name of Local Command :

Contract/Sol.# :

Limit Request To Clearly Releasable Info : Select Limit Request To Clearly Releasable Info ⌄

Attached Supporting Files

No supporting files have been added.

Upload Supporting Files

If you are having problems, or do not see the "Select Files" button, *switch to the basic uploader.*

No attachments have been added.

From:	Dorion Liston <dorion.liston@gmail.com>
Sent:	Thursday, April 07, 2016 8:39
To:	ONRFOIA
Subject:	[Non-DoD Source] Re: ONR FOIA 16-051

Jason,

Please process this FOIA request for "clearly releasable information" only.

Respectfully.

Dorion

On Wed, Apr 6, 2016 at 6:19 AM, ONRFOIA <onrfoia@nmci-isf.com> wrote:

Good Afternoon:

Due to the nature of the documentation you requested, we are required under Executive Order 12,600 to allow the contractor to review the responsive records for any proprietary or sensitive commercial information before we make our release determination. Contractors are normally afforded at least 15 days to complete this process, though it could take longer. Of course, we also have to review the records ourselves to determine whether and to what extent any other redactions may be warranted. And then we must make any necessary redactions and coordinate the final response through the Initial Denial Authority.

Alternatively, if you agree to receive only clearly releasable information, we can usually provide you with a final response within one week after we finish our search for responsive documents. Under the law, some information is almost always exempt from release. This information includes but is not limited to unit prices, the names of key personnel, and in some cases the names and contact information of certain other individuals. We will normally redact this information but will consider the rest of the information in our non-classified material to be clearly releasable.

If you agree to receive only clearly releasable information, you still retain your appeal rights in case you don't agree with any redactions we make. If you don't agree with the redactions, simply provide us a follow-on request for the redacted information. We will then expedite a response to that follow-on request through our Initial Denial Authority that gives you all your appeal rights under the law.

Please let us know whether you are willing to accept clearly releasable responsive records for this request.

V/r,

Jason

Jason C. Towns
Sr. FOIA Analyst

Contractor Support to ONR Code BD042
Data Federal Corporation
Office of Naval Research
875 N. Randolph St
Arlington, VA 22203
703-696-5361
ONRFOIA@navy.mil

Assessment of Traumatic Brain Injury with COBRA Oculometric Technologies

COBRA

Lee Stone (PI) Dorion Liston (co-I)

Background

The general link between eye movement disorders and neurological pathologies has long been known (Deiefendorf & Dodge, 1908; Leigh and Zee, 2006). More recently, a number of laboratories have linked Traumatic Brain Injury (TBI) with eye movement deficits such as disconjugate gaze (Samadani et al., 2015), abnormal antisaccades (Kraus et al., 2007), increased latency (Pearson et al., 2007) and directional errors (Heitger et al., 2006; Suh et al., 2006; Maruta et al., 2010), as well as impaired predictive tracking (Maruta et al., 2010, Suh et al., 2006). However, our COBRA technology goes beyond mere qualitative observations by establishing a multidimensional normal behavioral baseline and a sensitive vector-based analysis that can be used to detect and potentially characterize a wide range of neurological deficits (Liston & Stone, 2014).

Building on previous NASA funded basic research that rigorously demonstrated a quantitative link between our oculometric measures and perceptual performance (for a review see, Stone et al., 2009), our FY14 and FY15 ONR-funded work has now demonstrated that neurological indicators associated with TBI can be reliably captured and quantified using COBRA. Of the ten dimensions of eye-movement performance assayed by COBRA, six were significantly impaired in our population of 34 TBI subjects (Bonferroni-corrected Wilcoxon rank sum test, $p<0.05$). The mean COBRA vector for the TBI subjects was then used to define a TBI impairment vector, which characterizes the overall pattern of deficits observed in TBI subjects. We also developed a scalar metric of overall impairment (the TBI impairment index) which afforded a TBI detectability of over 80% for our TBI population. Furthermore, for TBI subjects subjectively reporting "little to no" residual effect of their TBI, we observed a TBI impairment index that was not significantly distinguishable from the control population ($p>0.05$, bootstrap test on ROC area), whereas those reporting more severe residual injuries showed a detectability around 90% (Fig. 1). Thus, COBRA can reliably detect subtle signs of neurological impairment within our TBI population, validating the primary premise of our ONR-funded project. In FY16, we will focus on the next critical issue, whether or not COBRA provides specificity in its measures such that TBI severity can be distinguished from other commonly correlated co-factors, e.g. fatigue and PTSD.
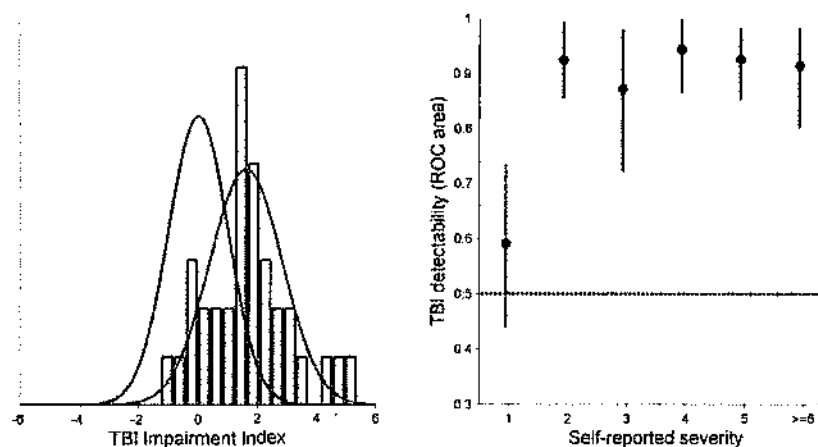

Figure 1. TBI impairment index. A plots the histogram of TBI impairment indices (red unfilled bars) and fitted normal distribution (solid red line) for our population of 34 TBI subjects and for our baseline population of 41 normal control subjects (solid green line). B plots the measured ROC area for each of the self-reported severity levels for residual effects of TBI, in our population. Filled black circles plot the average of 1000 bootstrapped measurements for each severity levels; error bars show the central 90% of the bootstrapped distribution.

At the outset of our ONR project, we had demonstrated a TRL level of 3, with anecdotal observations of deviations from our normal population associated with a Retinitis Pigmentosa patient, demonstrating the "characteristic proof of concept" that COBRA could potentially be used to detect and screen for neurological signs of injury and disease. In addition to the TBI validation study described above, over the course of the first two years of this ONR project, we first refined and enhanced our lab-built COBRA system and components, including a lab-built eyetracker, a new stimulus display and associated software, as well as standalone data analysis code, each validated separately. We then integrated these components into an initial deployable prototype capable of collecting COBRA data, not only in laboratory conditions, but also in field. Specifically, we brought our COBRA prototype 1.0 to JIFX 15-3 in May 2015 (Fig. 2), a system prototype for use in a quasi-operational environment thus transitioning COBRA to TRL level at least 4, and probably 5.
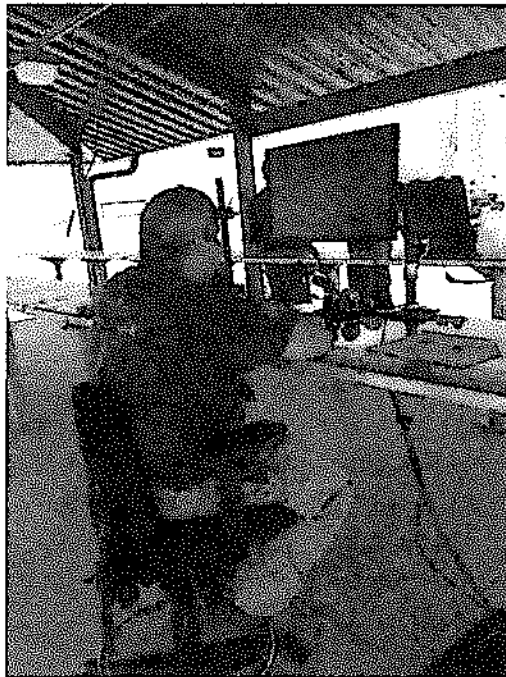

Figure 2. COBRA prototype 1.0 used at JIFX (Joint Interagency Field Experimentation) 15-3 integrated scenario in May, 2015. We assembled our device in the outside pavilion at Camp Roberts' CACTF and collected data from several participants, including the simulated hostage in the scenario. During the scenario, our device was operated by a member of the JIFX team from the Naval Postgraduate School who was able to collect excellent data (precision < 0.3 deg) under challenging conditions with limited training.

Proposed FY16 Studies

Study 1: Empirical validation of Deployable Prototype 1.0:

As part of the validation of our new COBRA Deployable Prototype 1.0, in a within-subject designed study, we will measure COBRA metrics from a sample of normal control observers (n=10) using our older laboratory system (which uses a 60Hz CRT) with those collected using our new deployable prototype

(which uses a 144 Hz LCD monitor). In our previous work (Fig. 3 in Liston & Stone, 2014) using a laser galvanometer display (a quasi-analog display with a 2kHz refresh rate), we observed that COBRA metrics are somewhat sensitive to both sampling rate (30-240 Hz) and sampling type (sample-and-blank vs sample-and-hold), although point comparisons between COBRA metrics (n=6 observers) for 60 Hz sample-and-blank (simulating a CRT display) and 240 Hz sample-and-hold (simulating a LCD) motion showed no significant differences (Bonferroni-corrected paired t-test, p>0.05) for latency, acceleration, steady-state gain, proportion smooth, or catch-up saccade amplitude. It is also well known that image contrast affects motion perception (Stone & Thompson, 1992) so the higher luminance contrast of the display target on the prototype may also affect its measurements, so we will use this study to set the luminance levels of the prototype target and background.

Study 2: Establish a new age-matched baseline of normal performance with the prototype system:

In our earlier study, our population of normal observers was between 20 and 56 years old. In order to provide for a better age-matching of our target population of military subjects, we will collect a new control dataset (n=30, age-range: 18-40 years old) using our deployable COBRA hardware device (Fig. 1) for comparison with (potentially or actually) impaired populations.

Study 3: Effect of fatigue on COBRA measures (NEW):

To quantify the sensitivity of COBRA to neurological indicators of fatigue, we will use standard methods in experimental manipulations of fatigue. First, experimental participants (n=12, age-range:18-40) will complete a two-week baseline sleep satiation period, in which the subjects are fitted with activity monitors to monitor the duration and quality of their rest, and will be instructed to maintain a consistent bedtime and wake time each day to promote a healthy baseline of rest prior to the fatigue manipulation. COBRA metrics will be taken periodically during this portion of the experiment. We will perform a circadian phase measurement for each participant, by taking saliva, urine, and/or core body temperature at regular intervals over the course of one circadian cycle to align the fatigue manipulation and COBRA measurements to each subject's circadian phase (Sletten, Segal, Flynn-Evans, Lockley, & Rajaratnam, 2015). Second, we will expose the subjects to one 30-hour period of wakefulness in the lab (Goel et al., 2013), with COBRA performance data taken at regular intervals, along with the psychomotor vigilance task (PVT; Dinges & Powell, 1985) and/or Automatic Neuropsychological Assessment Metrics (ANAM). Third, during the recovery portion, we will collect COBRA measures periodically as subjects recover from the 30-hour period of wakefulness.

We hypothesize that COBRA metrics from a fatigued population will deviate significantly from the COBRA metrics of our normal control population, in a manner distinguishable from that observed with our previous TBI subjects.

Study 4: Effect of PTSD on COBRA measures (NEW):

To quantify the sensitivity of COBRA to PTSD-related neurological signs, we will measure COBRA metrics from a population (n = 12) of PTSD patients. Using the Ohio State TBI assessment interview (Corrigan & Bogner, 2007), we will screen out cases with TBI and will assess the severity of PTSD symptoms with the PTSD Civilian Checklist (Weathers, et al., 1994). Using the COBRA vector-analysis techniques developed as indicators of neurological impairment and used to characterize TBI as reported at the 2015 FHP Program Review (Fig. 2), we will determine the characteristic COBRA impairment vector for PTSD and compute a PTSD impairment index for each subject. The former will allow us to potentially differentiate TBI effects from PTSD effects and the latter will allow us to quantify PTSD detectability using COBRA as we did for TBI.

We hypothesize that any deviation of COBRA metrics of our PTSD population from that of our normal control population will either be insignificant, or distinguishable from the effects of both fatigue and TBI.

Study 5: Game-ability Study:

We have shown that oculomotor responses recorded by COBRA are reliable sensitive measures of the speed, accuracy, and precision of neural processing supporting dynamic visual processing. Our experience strongly suggests that any volitional attempt to degrade the speed, precision, or accuracy of oculomotor responses in a graded manner, without simply failing to perform the tracking task altogether, would fail and be easily detectable and distinguishable from the oculomotor responses of all but the most severely impaired neurologically cases (i.e. ones where subtle behavioral methods aren't relevant in the first place). To test this hypothesis, we will propose a study that brings a deployable COBRA prototype 2.0 (with enhanced software for greater usability and automation – see below) to an external military site (e.g. JIFX16-1 in February 2016 at the Naval Postgraduate School). We will have a number of uniformed personnel volunteers (n=~8) each run two COBRA sessions. One to establish a legitimate set of performance measurements, and one in which the war fighter attempts to "game" COBRA and generate apparently compromised behavior that cannot be distinguished from neurological compromise. We will use these two sets of data to determine the potential for game-ability and its detection. We will also run preliminary versions of this experiment on NASA Ames personnel to optimize the design.

Hardware/software development efforts:

Based upon feedback from ONR personnel at the July, 2015 FHP program review and uniformed service members at JIFX15-3, we will incorporate several usability improvements and design modifications into COBRA during this calendar year. First, we plan to design a variant on the COBRA task that will converge to a set of COBRA metrics in as few trials as statistically necessary, to introduce an element of self-competition into the test. Following a full 180-trial baseline test, we hypothesize that consistent behavior on a subsequent test can detected in fewer than 180 trials (perhaps as few as 60-100 trials). We will evaluate whether COBRA metrics have remained consistent across repeated sessions, given a variable number of trials, and will end the test when subject have proved consistency. Thus, highly-motivated subject may be able to compete to finish COBRA in a shorter amount of time (i.e., fewer trials). Second, we plan to automate several components of the eye-tracking software, including setting of the pupil grayscale threshold, computing a pupil-thresholding quality metric, and beginning the COBRA task automatically following an automated acceptance of the calibration quality. Third, we plan to refine our current COBRA hardware prototype (e.g., chair height, table height, display height, camera location, illuminator location) based upon an anthropometric survey of U.S. Army personnel (Gordon et al., 2012).

Deliverables:

- We will complete a full study of 10 control subjects to test and validate the prototype system.
- We will collect a full sample of 30 control subjects as a reference population using our deployable COBRA prototype 1.0.
- We will complete a fatigue study of 12 subjects to determine the effects of fatigue on COBRA measures and to determine how they differ from those associated with TBI.
- We will complete a PTSD study of 12 patients to determine the effects (if any) of PTSD on COBRA and to determine how they differ from those associated with fatigue and TBI.
- We will complete a Game-ability study on 8 subjects to determine whether or not COBRA data can be gammed and if so whether such gaming can be detected.

Total Budget: Total [REDACTED]

Personnel (Labor and benefits):

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] [REDACTED]

Subject costs:

[REDACTED]
[REDACTED]

Fatigue study costs:

[REDACTED]

HW and SW support:

[REDACTED]
[REDACTED]

Travel / collaboration:

[REDACTED]

[REDACTED]

[REDACTED]

Indirect Costs (NASA):

[REDACTED]

Indirect Cost (San Jose State):

[REDACTED]

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